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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/000,284	11/15/2001	Dong Wu	56530US002	9016
32692	7590	09/28/2006	EXAMINER	
3M INNOVATIVE PROPERTIES COMPANY			SHOSHO, CALLIE E	
PO BOX 33427			ART UNIT	PAPER NUMBER
ST. PAUL, MN 55133-3427			1714	

DATE MAILED: 09/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/000,284

**Applicant(s)**

WU ET AL.

**Examiner**

Callie E. Shosho

**Art Unit**

1714

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

#### **Continued Examination Under 37 CFR 1.114**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/6/06 has been entered.

#### **Claim Rejections - 35 USC § 103**

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

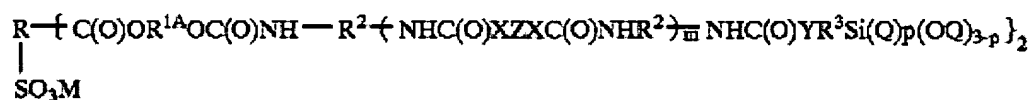
3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-2, 4, 6, 8-9, 15-27, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano et al. (U.S. 2003/0236321) in view of Krepski et al. (U.S. 5,929,160).

Sano et al. disclose water-based ink comprising pigment, thermosetting polyurethane, and additional dispersed acrylic polymer. There is also disclosed ink set comprising cyan, magenta, yellow, and black inks. There is further disclosed method of printing the ink onto substrate using ink jet printer (paragraphs 2, 4, 29, 33, 51-52, 58, 63, and 151).

The difference between Sano et al. and the present claimed invention is the requirement in the claims of (a) silyl-terminated sulfopoly(ester-urethane) polymer and (b) ink set comprising white ink.

With respect to difference (a), Krepski et al., which is drawn to coatings for paper, disclose the use of up to 70% silyl-terminated sulfopoly(ester-urethane) polymer of the formula:



which, when m is 0, is identical to that presently claimed when m is 1, n is 0, s is 0, R<sup>D</sup> is alkylene group, X<sup>1</sup> is OC(O)NH, R<sup>2</sup> is alkylene group, X<sup>2</sup> is NHC(O)NH, R<sup>3</sup> is alkylene group, and Y is Si(OR<sup>8</sup>)(R<sup>4</sup>) where R<sup>8</sup> is H or lower alkyl and R<sup>4</sup> is lower alkyl. The silyl-terminated sulfopoly(ester-urethane) polymer is used in order to impart toughness, weatherability, abrasion resistance, and enhanced adhesion to substrate (col.4, line 66-67 and col.5, lines 13-16).

In light of the motivation for using silyl-terminated sulfopoly(ester-urethane) polymer disclosed by Krepski et al. as described above, it therefore would have been obvious to one of ordinary skill in the art to use silyl-terminated sulfopoly(ester-urethane) polymer in the ink of Sano et al. in order to produce ink with good toughness, weatherability, abrasion resistance, and enhanced adhesion, and thereby arrive at the claimed invention.

With respect to difference (b), Sano et al. disclose ink set comprising cyan, magenta, yellow, and black inks. However, there is no disclosure of ink set comprising five inks including white ink as presently claimed.

However, it would have been within the skill level of one of ordinary skill in the art to recognize that depending on the desired colors present in the final image, the end use of the ink, the color of the substrate, etc., additional inks of different colors including white would be utilized in order to produce the desired printed image, and thereby arrive at the claimed invention.

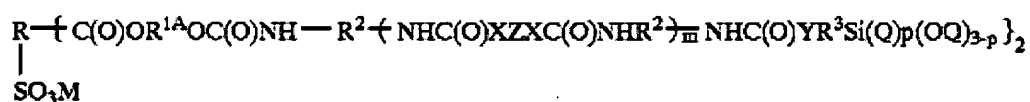
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5. Claims 1-5, 9-16, 23-25, 27, 31, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu (U.S. 5,889,083) in view of Krepski et al. (U.S. 5,929,160).

Zhu discloses ink jet ink comprising aqueous medium, 0.1-10% pigment or dye, humectant, 1-40% polyurethane, and if used, 1-5% organic solvent. The ink has viscosity of 1-10 cP. The ink is printed onto substrate such as paper, glass, and plastic. There is also disclosed a printing process wherein the above ink is jetted onto paper using ink jet printer to form printed article (col.2, line 66-col.3, line 1, col.3, lines 16-28, col.4, line 55, col.6, lines 29 and 33-35, col.9, line 7, and col.10, lines 52-63).

The difference between Zhu and the present claimed invention is the requirement in the claims of silyl-terminated sulfopoly(ester-urethane) polymer.

Krepski et al., which is drawn to coatings for paper, disclose the use of silyl-terminated sulfopoly(ester-urethane) polymer of the formula:



which, when m is 0, is identical to that presently claimed when m is 1, n is 0, s is 0, R<sup>D</sup> is alkylene group, X<sup>1</sup> is OC(O)NH, R<sup>2</sup> is alkylene group, X<sup>2</sup> is NHC(O)NH, R<sup>3</sup> is alkylene group, and Y is Si(OR<sup>8</sup>)(R<sup>4</sup>) where R<sup>8</sup> is H or lower alkyl and R<sup>4</sup> is lower alkyl. The silyl-terminated sulfopoly(ester-urethane) polymer is used in order to impart toughness, weatherability, abrasion resistance, and enhanced adhesion to substrate (col.4, line 66-67 and col.5, lines 13-16).

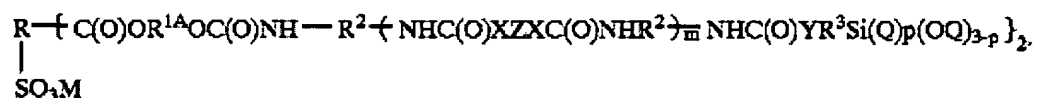
In light of the motivation for using silyl-terminated sulfopoly(ester-urethane) polymer disclosed by Krepski et al. as described above, it therefore would have been obvious to one of ordinary skill in the art to use silyl-terminated sulfopoly(ester-urethane) polymer in the ink of Zhu in order to produce ink with good toughness, weatherability, abrasion resistance, and enhanced adhesion, and thereby arrive at the claimed invention.

6. Claims 1-2, 4-12, 15-16, 23-25, 27-30, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erdtmann et al. (U.S. 6,533,408) in view of Krepski et al. (U.S. 5,929,160).

Erdtmann et al. disclose ink jet ink comprising aqueous medium, pigment, humectant, and 0.1-10% polyurethane. The pigment is present in amount of up to 30% for organic pigment and as high as 75% for inorganic pigment. The ink is printed onto substrate such as fabric, paper, plastic or film. There is also disclosed a printing process wherein the above ink is jetted onto paper using piezoelectric ink jet printer to form printed article (col.1, lines 16-20, col.2, lines 65-67, col.3, lines 10-19, col.4, line 19, col.5, lines 1-3 and 52-61, col.5, line 67-col.6, line 1, col.8, lines 51-53, col.9, lines 27-44, and col.15, lines 28-30).

The difference between Erdtmann et al. and the present claimed invention is the requirement in the claims of silyl-terminated sulfopoly(ester-urethane) polymer.

Krepski et al., which is drawn to coatings for paper, disclose the use of silyl-terminated sulfopoly(ester-urethane) polymer of the formula:



which, when m is 0, is identical to that presently claimed when m is 1, n is 0, s is 0, R<sup>D</sup> is alkylene group, X<sup>1</sup> is OC(O)NH, R<sup>2</sup> is alkylene group, X<sup>2</sup> is NHC(O)NH, R<sup>3</sup> is alkylene group, and Y is Si(OR<sup>8</sup>)(R<sup>4</sup>) where R<sup>8</sup> is H or lower alkyl and R<sup>4</sup> is lower alkyl. The silyl-terminated sulfopoly(ester-urethane) polymer is used in order to impart toughness, weatherability, abrasion resistance, and enhanced adhesion to substrate (col.4, line 66-67 and col.5, lines 13-16).

In light of the motivation for using silyl-terminated sulfopoly(ester-urethane) polymer disclosed by Krepski et al. as described above, it therefore would have been obvious to one of ordinary skill in the art to use silyl-terminated sulfopoly(ester-urethane) polymer in the ink of Erdtmann et al. in order to produce ink with good toughness, weatherability, abrasion resistance, and enhanced adhesion, and thereby arrive at the claimed invention.

### **Response to Arguments**

7. Applicants' arguments filed 7/6/06 have been fully considered but they are not persuasive.

Specifically, applicants argue that there is no reasonable expectation of success that the silyl-terminated sulfopoly(ester-urethane) of Krepski et al. would jet out of an ink jet head.

Applicants argue that while it is desirable to provide a high solids ink, attempts to prepare high solids ink have met with various problems such as flocculation of pigment, etc.



However, it is noted that there is no requirement in the present claims that the ink has high solids content with the exception of claims 10-12. Each of Zhu and Erdtmann et al. disclose ink with solids content as required in present claims 10-12. Further, it is noted that each of Sano et al., Zhu, and Erdtmann et al. disclose the use of ink comprising polymer. Each of these references is combined with Krepski et al. to teach the use of specific type of polymer as presently claimed. Thus, given that each of Sano et al., Zhu, and Erdtmann et al. already disclose the use of polymer in the ink wherein the ink functions as an ink jet ink, one of ordinary skill in the art would also expect the ink to function as ink jet ink when silyl-terminated sulfopoly(ester-urethane) is utilized as the polymer in each of the inks.

Applicants argue that there is no reasonable expectation of success given that the silyl-terminated sulfopoly(ester-urethane) is self-crosslinking and that one skilled in the art would expect these self-crosslinking silyl-terminated sulfopoly(ester-urethane) would not be usable in ink jet printing process since it is well known that clogging the ink jet head nozzle occurs when high solids inks crosslink or polymerize.

However, it is well known to utilize self-crosslinkable polymer in ink jet inks. Evidence to support this position is found in Miyabayashi et al. (U.S. 6,271,285) and Fukuda et al. (U.S. 6,075,085) which each disclose ink jet ink comprising self-crosslinking polymer (Miyabayashi et al. – claim 3 and Fukuda et al. – abstract and col.3, lines 58-61). Thus, it is clear that ink comprising self-crosslinking polymer can jet out of a printhead.

In light of the teaching of Miyabayashi et al. or Fukuda et al. that discloses that it is well known to utilize self-crosslinkable polymer in ink jet inks, it is clear that one of ordinary skill in the art would expect self-crosslinkable polymer, including silyl-terminated sulfopoly(ester-

urethane) disclosed by Krepski et al., to properly function in ink jet ink and therefore, one of ordinary skill in the art would have a reasonable expectation of success when combining Sano et al. Zhu, or Erdtmann et al. with Krepski et al.

In the Advisory Action mailed 6/12/06, the examiner argued that the silyl-terminated sulfopoly(ester-urethane) of Krepski et al. were suitable for use in ink jet inks given that Krepski et al. disclose that the silyl-terminated sulfopoly(ester-urethane) has number average molecular weight of less than 50,000 (col.2, lines 42-45) which would overlap the molecular weight of the polymers utilized in each of Sano et al., Zhu, and Erdtmann et al. which disclose the use of polymer having molecular weight of 3,000-100,000 (Sano et al. – paragraph 62), approximately 5,000-30,000 (Erdtmann et al. – Table 1), and 1,500-50,000 (Zhu – col.4, lines 62-47), given that Krepski et al. disclose the use of silyl-terminated sulfopoly(ester-urethane) in polymer solution having viscosity of 1-50,000 cP (col.10, lines 47-48), the lower end of which would clearly meet the viscosity requirement of ink jet inks (see page 9, lines 12-15 of the present specification), and given that example 37 of Krepski et al. disclose the use of silyl-terminated sulfopoly(ester-urethane) having particle size of 93 nm which particle size would clearly be suitable for use in ink jet inks.

In response, applicants state that the molecular weight is irrelevant to particular use of polymer and that particle size and viscosity also do not demonstrate the suitability of polymer for particular use.

However, while it is agreed that the molecular weight, viscosity, and particle size alone do not determine the particular uses of a polymer, given that each of the molecular weight, viscosity, and particle size disclosed by Krepski et al. overlap those required in Sano et al., Zhu,

or Erdtmann et al., one of ordinary skill in the art would have a reasonable expectation of success when utilizing the silyl-terminated sulfopoly(ester-urethane) as the polymer in the ink of Sano et al., Zhu, or Erdtmann et al. That is, given that silyl-terminated sulfopoly(ester-urethane) disclosed by Krepski et al. meets the rheological, i.e. molecular weight and viscosity, and physical, i.e. particle size, properties of polymer utilized in ink jet inks, it is the examiner's position that one of ordinary skill in the art would have reasonable expectation of success that the silyl-terminated sulfopoly(ester-urethane) would properly function in ink jet inks, i.e. would jet out of ink jet head.

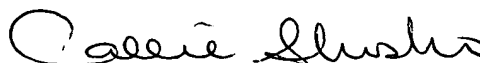
Thus, given that Krepski et al. disclose motivation for using specific polymer as presently claimed, i.e. impart toughness, weatherability, abrasion resistance, and enhanced adhesion to coatings on paper which are functions especially important to ink jet inks which are also utilized on paper, given that the composition of Krepski et al. utilizes similar ingredients as ink jet inks, i.e. water, pigment, dispersant, etc., given that Krepski et al. disclose the use of silyl-terminated sulfopoly(ester-urethane) which meets the rheological and physical requirements necessary in ink jet inks, and given that it is well known to utilize self-crosslinking polymer in ink jet inks (as evidenced by Miyabayashi et al. or Fukuda et al.), it is the examiner's position that one of ordinary skill in the art would have a reasonable expectation of success that the silyl-terminated sulfopoly(ester-urethane) of Krepski et al. would effectively function in ink jet ink and thus, it would have been obvious to one of ordinary skill in the art to combine Sano et al., Erdtmann et al., or Zhu with Krepski et al., and thereby arrive at the claimed invention.

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Callie E. Shosho whose telephone number is 571-272-1123. The examiner can normally be reached on Monday-Friday (6:30-4:00) Alternate Fridays Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Callie E. Shosho  
Primary Examiner  
Art Unit 1714

CS  
9/23/06